## Lenovo Global Technology

**ThinkSystem SR590**  
*(2.70 GHz, Intel Xeon Gold 5220S)*

**SPECs**peed® 2017 **int_base** = 10.1  
**SPECs**peed® 2017 **int_peak** = Not Run

### Hardware

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong></td>
<td>Intel Xeon Gold 5220S</td>
</tr>
<tr>
<td><strong>Max MHz:</strong></td>
<td>3900</td>
</tr>
<tr>
<td><strong>Nominal:</strong></td>
<td>2700</td>
</tr>
<tr>
<td><strong>Enabled:</strong></td>
<td>36 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td><strong>Orderable:</strong></td>
<td>1,2 chips</td>
</tr>
<tr>
<td><strong>Cache L1:</strong></td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td><strong>Cache L2:</strong></td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td><strong>Cache L3:</strong></td>
<td>24.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Memory:</strong></td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)</td>
</tr>
<tr>
<td><strong>Storage:</strong></td>
<td>1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OS:</strong></td>
<td>SUSE Linux Enterprise Server 12 SP4 (x86_64)</td>
</tr>
<tr>
<td><strong>Kernel:</strong></td>
<td>4.12.14-94.41-default</td>
</tr>
<tr>
<td><strong>Compiler:</strong></td>
<td>C/C++: Version 19.0.4.227 of Intel</td>
</tr>
<tr>
<td><strong>Compiler for Linux:</strong></td>
<td>C/C++</td>
</tr>
<tr>
<td><strong>Fortran:</strong></td>
<td>Compiler for Linux; Fortran: Version 19.0.4.227 of Intel Fortran</td>
</tr>
<tr>
<td><strong>Parallel:</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Firmware:</strong></td>
<td>Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-2019</td>
</tr>
<tr>
<td><strong>File System:</strong></td>
<td>btrfs</td>
</tr>
<tr>
<td><strong>System State:</strong></td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>Base Pointers:</strong></td>
<td>64-bit</td>
</tr>
<tr>
<td><strong>Peak Pointers:</strong></td>
<td>Not Applicable</td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td><strong>Power Management:</strong></td>
<td>--</td>
</tr>
</tbody>
</table>

---

### SPEC CPU® 2017 Integer Speed Result

**Lenovo Global Technology**

**ThinkSystem SR590**  
*(2.70 GHz, Intel Xeon Gold 5220S)*

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Test Date:** Aug-2019  
**Hardware Availability:** Jul-2019  
**Tested by:** Lenovo Global Technology  
**Software Availability:** May-2019

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Threads</strong></td>
<td></td>
</tr>
<tr>
<td>600.perlbench_s 72</td>
<td></td>
</tr>
<tr>
<td>602.gcc_s 72</td>
<td></td>
</tr>
<tr>
<td>605.mcf_s 72</td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s 72</td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s 72</td>
<td></td>
</tr>
<tr>
<td>625.x264_s 72</td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s 72</td>
<td></td>
</tr>
<tr>
<td>641.leela_s 72</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s 72</td>
<td></td>
</tr>
<tr>
<td>657.xz_s 72</td>
<td></td>
</tr>
</tbody>
</table>

---
SPEC CPU®2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR590
(2.70 GHz, Intel Xeon Gold 5220S)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

SPECspeed®2017_int_base = 10.1
SPECspeed®2017_int_peak = Not Run

Test Date: Aug-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>72</td>
<td>262</td>
<td>6.79</td>
<td>259</td>
<td>6.85</td>
<td>257</td>
<td>6.89</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>72</td>
<td>408</td>
<td>9.76</td>
<td>409</td>
<td>9.74</td>
<td>408</td>
<td>9.75</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>72</td>
<td>382</td>
<td>12.4</td>
<td>378</td>
<td>12.5</td>
<td>380</td>
<td>12.4</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>72</td>
<td>211</td>
<td>7.74</td>
<td>213</td>
<td>7.66</td>
<td>209</td>
<td>7.81</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>72</td>
<td>115</td>
<td>12.3</td>
<td>113</td>
<td>12.5</td>
<td>114</td>
<td>12.4</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>72</td>
<td>123</td>
<td>14.3</td>
<td>124</td>
<td>14.2</td>
<td>123</td>
<td>14.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>72</td>
<td>264</td>
<td>5.44</td>
<td>263</td>
<td>5.45</td>
<td>263</td>
<td>5.46</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>72</td>
<td>358</td>
<td>4.77</td>
<td>358</td>
<td>4.76</td>
<td>358</td>
<td>4.77</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>72</td>
<td>177</td>
<td>16.6</td>
<td>177</td>
<td>16.7</td>
<td>177</td>
<td>16.7</td>
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<tr>
<td>657.xz_s</td>
<td>72</td>
<td>265</td>
<td>23.3</td>
<td>265</td>
<td>23.3</td>
<td>265</td>
<td>23.3</td>
</tr>
</tbody>
</table>

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "~/home/cpu2017-1.0.5-ic19.0u4/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5-ic19.0u4/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>/proc/sys/vm/drop_caches

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4)
is mitigated in the system as tested and documented.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

(Continued on next page)
lenovo global technology
thinksystem sr590
(2.70 ghz, intel xeon gold 5220s)

specspeed®2017_int_base = 10.1
specspeed®2017_int_peak = not run

cpu2017 license: 9017

test sponsor: lenovo global technology
tested by: lenovo global technology

general notes (continued)

platform notes

bios configuration:
choose operating mode set to maximum performance
choose operating mode set to custom mode
memory power management set to automatic
cpu p-state control set to cooperative
monitor/mwait set to enable

sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-2uov wed aug 28 10:04:22 2019

sut (system under test) info as seen by some common utilities.
for more information on this section, see
https://www.spec.org/cpu2017/docs/config.html#sysinfo

from /proc/cpuinfo
model name : intel(r) xeon(r) gold 5220s cpu @ 2.70ghz
  2 "physical id"s (chips)
  72 "processors"
 cores, siblings (caution: counting these is hw and system dependent. the following
 excerpts from /proc/cpuinfo might not be reliable. use with caution.)
  cpu cores : 18
  siblings   : 36
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

from lscpu:
architecture: x86_64
cpu op-mode(s): 32-bit, 64-bit
byte order: little endian
cpu(s): 72
on-line cpu(s) list: 0-71
thread(s) per core: 2
core(s) per socket: 18
socket(s): 2
numa node(s): 2
vendor id: genuineintel
cpu family: 6
model: 85
model name: intel(r) xeon(r) gold 5220s cpu @ 2.70ghz
stepping: 7
cpu mhz: 2700.000
cpu max mhz: 3900.0000

(continued on next page)
## Lenovo Global Technology

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(2.70 GHz, Intel Xeon Gold 5220S)

### SPECspeed®2017_int_base = 10.1

### SPECspeed®2017_int_peak = Not Run

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
<th>Test Date:</th>
<th>Aug-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Jul-2019</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

```plaintext
CPU min MHz:           1000.0000
BogoMIPS:              5400.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              25344K
NUMA node0 CPU(s):     0-17,36-53
NUMA node1 CPU(s):     18-35,54-71
Flags:                 fpu vme de pse tsc msr pae mce cmov
                        pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
                        lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
                        cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
                        fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
                        aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
                        invpcid_single intel_pmm ssbd ibrs ibpb stibp tpr_shadow vnmi flexpriority ept
                        vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
                        avx512f avx512dq rdseed adx clflushopt clwb intel_pt avx512cd avx512bw avx512vl
                        xsaveopt xsavec x Getbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                        dtstream ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke
                        avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 25344 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 36 37 38 39 40 41 42 43 44 45
            46 47 48 49 50 51 52 53
  node 0 size: 96352 MB
  node 0 free: 95405 MB
  node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 54 55 56 57 58 59 60
            61 62 63 64 65 66 67 68 69 70 71
  node 1 size: 96709 MB
  node 1 free: 96364 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal:       197694664 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB
```

(Continued on next page)
**SPEC CPU®2017 Integer Speed Result**

**Lenovo Global Technology**

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**Platform Notes (Continued)**

SuSE-release:
- SUSE Linux Enterprise Server 12 (x86_64)
- VERSION = 12
- PATCHLEVEL = 4
  
  # This file is deprecated and will be removed in a future service pack or release.
  
  # Please check /etc/os-release for details about this release.

os-release:
- NAME="SLES"
- VERSION="12-SP4"
- VERSION_ID="12.4"
- PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
- ID="sles"
- ANSI_COLOR="0;32"
- CPE_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:
- x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

- CVE-2017-5754 (Meltdown): Not affected
- CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Aug 28 10:03

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4

Filesystem | Type | Size | Used | Avail | Use% | Mounted on
--- | --- | --- | --- | --- | --- | ---
/dev/sdb3 | btrfs | 740G | 50G | 690G | 7% | /home

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

**BIOS Lenovo -[TEE141E-2.30]- 07/02/2019**

**Memory:**
- 4x NO DIMM NO DIMM
- 12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2666

(End of data from sysinfo program)
Lenovo Global Technology
ThinkSystem SR590
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SPECspeed®2017_int_base = 10.1
SPECspeed®2017_int_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Aug-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Compiler Version Notes

==============================================================================
C       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
| 625.x264_s(base) 657.xz_s(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++     | 620.omnetpp_s(base) 623.xalanchmk_s(base) 631.deepsjeng_s(base)
| 641.leela_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 648.exchange2_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64

(Continued on next page)
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---

**Base Portability Flags (Continued)**

623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
- -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc

Fortran benchmarks:
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
- -nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.xml